

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

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PLANS FOR INSECT CONTROL, YOSEMITE NATIONAL PARK

FISCAL YEAR 1930

(Memorandum for Superintendent)

by

J. M. MILLER
Senior Entomologist

with

FOREST INSECT CONDITIONS ON THE VALLEY FLOOR

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H. E. BURKE
Senior Entomologist

Stanford University, California
August 31, 1929

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MEMORANDUM FOR SUPERINTENDENT, YOSEMITE NATIONAL PARK

Plans for Insect Control, Fiscal Year 1930

In formulating further plans for insect control activities within the Yosemite National Park it seems best to concentrate our efforts on those situations where the greatest values are at stake and where there seems to be the best possibility of protecting them. The expenditure of funds for control work should be governed largely by these considerations. In the present report I shall try to suggest those areas where under present conditions work of this character appears to be most worth while.

The question of when and where to do control work within national parks is not always an easy one to decide. The actual values to be assigned to the forest cover of certain areas are often intangible. The loss of stumpage values due to killing of the trees by insects is of little concern where forests are not protected for the amount of lumber they may produce. Primarily, forests within the national parks are preserved because of their value for scenic, recreational, wild life and educational purposes. In the more remote, little-visited regions of the Yosemite, the killing of a low percentage of the forest cover does not seriously interfere with these objectives. Where a few trees or groups of trees die, younger trees spring up in the opening and the general effect of the cover is maintained. Even the killing of all mature trees, as in the dead forests of Jack Main Canyon and other tributaries of the Tuolumne, has not interfered with the general purpose for which the Yosemite National Park was set aside. In the school of thought which would look to

the Parks as a place where nature takes its course, these dead forests are of special interest and value as an outstanding demonstration of the power of insect armies.

On the other hand, there are certain areas where the killing of even a few trees may seriously detract from the visitor's interest in and enjoyment of the Park. Giant trees, like the yellow pines on the valley floor, which have survived several centuries of storms, fires and competition with their neighbors, may be killed in a few weeks by a concerted attack of bark beetles. These deadened trees are unsightly, an obvious fire hazard, and a menace to the safety of the traveler and camper. The young growth which later comes into the openings where mature trees are killed entirely lacks the esthetic interest and beauty of the old veterans. The killing of trees needed for campground cover and as a setting for buildings interferes with the development of public accommodations. The loss of mature trees along highways and their replacement by dense stands of young growth which screen the view may deprive the visitor of some of the finest vistas in the Park. These considerations make it obvious that certain trees and forests within the Park take on values far in excess of their use for potential lumber or watershed cover. The cost of their protection, therefore, cannot be measured by the same standards as those applied to commercial forests.

Any comprehensive program of protection against insect damage must depend upon prompt detection of trouble as soon as it starts. An annual survey of those areas where outbreaks are likely to occur is necessary in order that incipient epidemics may be attacked before they get out of hand. However, it is obviously impossible with present resources

of funds and man power to extend annual insect surveys over all forest areas of the park or to undertake control work wherever outbreaks of damage may occur. Neither does it seem desirable to carry on work to this extent if we follow some recognized policy and concentrate our attention on those areas where protection is warranted only from a national park viewpoint.

I am proposing, therefore, that we eliminate from anything more than incidental observation those areas where no serious conditions are to be expected, or where the obvious values do not warrant an expenditure of funds for control work. The areas which we can throw out are:

1. Areas where the predominating tree species are not susceptible to insect attacks. This includes mountain hemlock and some other alpine species where no serious trouble has developed.

2. Inaccessible and little-visited areas where the loss of timber has no bearing upon the use of the Park, and where present epidemics do not threaten the forests in intensively-used sections. This applies to the northern tributaries of the Tuolumne River and the drainage of the South Fork of the Merced east and north of the Wawona district.

3. Accessible areas where insects have already killed the mature trees to such an extent that there is little material left for them to work on and protection work is therefore useless. This applies to areas like those bordering the Tioga Road for several miles east of Lake Tenaya and the Cathedral Creek Basin.

In selecting areas where our attention should be concentrated I have had in mind the following considerations:

1. The more intensively-used sections, where the present forest cover is needed for recreational, scenic and educational purposes;

2. Areas bordering main traveled roads, where preservation of the mature trees is desirable and where dead snags add to the fire danger;

3. Areas of special esthetic or historic interest, like the Wawona and Merced Groves of big trees;

4. Areas which in themselves may not warrant protection but where existing insect epidemics threaten to invade more valuable sections of the Park.

For convenience in reference the areas selected have been designated by number as well as name.

AREA 1. YOSEMITE VALLEY FLOOR AND LOWER WEDGED CANYON

Including the valley floor proper and the area between the Sawona and Big Oak Flat Roads for about five miles below the El Capitan bridge

Principal host trees and insects involved:

(Western Pine Beetle
Yellow Pine - (Red Turpentine Beetle
(Flat-Headed Borer
White Fir - (White Fir Engraver Beetle
Cottonwood)
Willow) - Oyster Shell Scale
Dogwood)
Black Oak - (Pacific Oak Twig Girdler

Control work against the western pine beetle, which attacks mainly old mature yellow pine, has been carried on intermittently since 1914. When control work was started during the winter of 1914-15, 267 trees were treated on this area. Since then continued treatment of the infestation--mainly through utilization of dead trees for wood--has kept the annual loss down to less than 50 trees.

Close survey work and control should by all means be continued on this area. Continued cutting of green trees for rights of way, buildings and landscaping has created something of a problem with the red turpentine beetle. This phase of the damage can be easily handled, however, if closely watched. Special control methods to save trees after attack were used successfully by the Yosemite Park and Curry Company during the 1923 season.

Considerable loss has been sustained since 1924 in white fir, due to the white fir engraver beetle. No control work has been attempted, but cutting and burning the infested bark during the spring period is recommended on this area.

A separate report by Mr. Burke is attached which gives in more detail the conditions found on the valley floor during the 1923 season.

AREA 2. SAWONA ROAD STRIP

Including the mature timber bordering this road for a distance of half a mile on either side from Inspiration Point to Alder Creek.

Principal host trees and insects involved:

Yellow Pine - Western Pine Beetle
Sugar Pine - Mountain Pine Beetle

The problem here is to protect as long as possible the mature timber which has been preserved as a cover to this road. Due to the isolation created by the cutover lands bordering a considerable portion of this strip, this project appears to be feasible. The loss sustained during the 1923 season was estimated at 48 large trees.

AREA 3. MANIPOSA BIG TREE GROVE

Including the entire area of this grove and surrounding Park lands, with the exception of the steep slope of the South Fork of the Merced Canyon

Principal host trees and insects involved:

Sugar Pine - Mountain Pine Beetle
Yellow Pine - Western Pine Beetle

The loss sustained in this small area consists mainly of sugar pine in the vicinity of the big trees. It was estimated that 30 trees were killed during the 1923 season. This area should be kept under maintenance control and the infested trees treated each season.

AREA 4. LITTLE YOSEMITE

Including the valley of the Little Yosemite and adjoining slopes.

Principal host trees and insects involved:

Jeffrey Pine - Jeffrey Pine Beetle
Yellow Pine - Western Pine Beetle
Lodgepole Pine Mountain Pine Beetle

This area has suffered the loss of a considerable number of large Jeffrey pines. Control work was carried out in 1914 and again in 1918. No recent examinations of the area have been made. It should be kept under observation and action started if the infestation shows any tendency toward a decided increase.

AREA 5. TUOLUMNE MEADOWS

Including the lodgepole stands bordering the meadows, especially those east of Lambert Dome which have not been depleted.

Lodgepole Pine Mountain Pine Beetle
Western White Pine - " "

The history of insect infestations in this area since 1912 is fully covered in reports on file in the Yosemite office. The mountain pine beetle epidemic which followed the needleminer defoliation invaded the western part of the area about 1918. By 1924 it had killed the greater part of the lodgepole stand as far east as Lambert Dome. At this point the epidemic subsided, leaving the lodgepole stands intact at the eastern end of the Meadows. Since 1924 scattered attacks have developed in a zone extending for about a mile and a half east of the deadened areas. This recent infestation has shown no tendency to form large groups or become aggressive, but there was some increase in the number of 1923 attacks over those of the preceding seasons.

The old epidemic also left a fringe of green trees along the borders of the Meadows, as well as scattered green trees in the heavily-deadened areas. For the past four years there has been a gradual killing of these surviving trees. This hangover from the old epidemic could be disregarded, as it is not sufficiently aggressive to threaten the stands at the eastern part of the Meadows, except for the fact that it is killing trees needed for campground cover. On August 21 a count of trees was made on the campground area where Budd Creek enters the Meadows:

No. green trees (over 4" d.b.h.)	- - - -	141
No. dead	"	"
Killed 1928	- - - -	23
" prior to 1928	- -	<u>107</u>
		<u>130</u>
Total	- - - -	-271

This particular campground is now nearly 80 per cent denuded, and the slow killing of the remaining trees will apparently continue. Conditions here, however, are much worse than they are around Tuolumne Lodge and the campgrounds at the eastern end of the Meadows. There is always the possibility, however, of the infestation again becoming aggressive, and in that case the lodgepole stands to the east of Lambert Dome are the ones that will suffer the heaviest losses.

In some parts of the deadened areas mountain hemlock is coming in and replacing the lodgepole stands killed by the beetle. This is a most encouraging development, as the hemlock is a tree of greater beauty and as yet has developed no serious insect enemies. However, it should be kept in mind that this is occurring only on the north slopes and better sites, where hemlock was already established and competing with the lodgepole prior to the bark beetle invasion. On the poorer sites practically no hemlock has as yet appeared in the deadened area, and the replacement of the lodgepole by this species will at best be a slow process. Much of the dead forest is being restocked by dense stands of young lodgepole.

Treatment of the infestation in the eastern end of the Meadows is recommended as a measure to protect the campground cover and to prevent the building up of an epidemic center. The 1928 infestation in this zone is estimated at 250 trees. A fund of \$500, to be supplemented when the extent of the 1929 attack has been determined, should be provided if control work is undertaken.

RECOMMENDATIONS

In selecting the above areas I have for the present left out of consideration the areas along the Big Oak Flat Road from Gentry to Crane Flat, as any protection program here will depend upon adjustment of the park boundary and the re-location of this road. As long as logging op-r-

ations are continued along the western boundary I believe this will have a beneficial effect on barkbeetle infestations in adjoining areas of the Park. Green logs usually attract a certain percentage of the barkbeetles during the flight period, and where the logs are moved a considerable distance to be milled the beetles are carried out with them.

I should recommend the following program for the remainder of this fiscal year:

1. Continued surveillance of Area 1, to be followed up by control work through utilization of the infested trees or through a special control allotment;

2. A survey of Area 4 during September to determine the extent of the 1929 attack in Jeffrey pine and yellow pine;

3. A survey of Areas 2 and 3 during September and October as a basis for estimates of the 1929 infestation; control work to be carried out during the coming winter and spring period;

4. An examination of Area 5 in October to determine the extent of the 1929 attacks in lodgepole pine in the eastern part of the Tuolumne Meadows; control work to be carried out during May and June, 1930.

Allotments recommended:

For maintenance control work in Area 1 - -	\$500.
" control work in Areas 2 and 3 - - - -	1000.
" control work in Area 5 - - - -	500.
Total - - -	\$2000.

These allotments are based on conditions as reflected by the 1928 infestation, and should be modified if the surveys which Mr. Adair will make during the remainder of this season indicate a change during the 1929 season.

Respectfully submitted,

Senior Entomologist

Stanford University, Calif.,
August 31, 1929

MEMORANDUM FOR SUPERINTENDENT, YOSEMITE NATIONAL PARK

Forest Insect Conditions on the Valley Floor

Forest insect conditions on the floor of the valley appear more favorable than last season.

The turpentine beetle, Dendroctonus valens Lec., does not attract as much attention as last year. No attacks have been reported, and none was seen during the investigations made from August 20 to 23. The yellow pines near the Ahwahnee Hotel, attacked last season and treated with injections of carbon bisulphid by Mr. Vaughan of the Yosemite Park and Curry Company, have recovered and appear to be in good condition. The large yellow pine in the Ahwahnee bungalow area, which was heavily attacked and treated by cutting out the broods and painting with creosote, is still alive and green. So little of the cambium remains, however, that it hardly seems possible that it can make a complete recovery. Developing broods of the beetle were found under the bark of some fallen trees and in stumps. Undoubtedly the species is still present in numbers in the Valley, and when any new building is constructed early in the season, attacks on nearby pine trees are to be expected.

The oyster shell scale, Lepidosaphes ulmi (Linn.) did not produce as large a brood this season as last. In many places there appear to be no young scales. The browning of this season's foliage indicates that a few large cottonwoods and a number of small ones, as well as some willows and some creek dogwood, continue to die from the injuries caused by past seasons' infestations. A small, light-colored, wasp-like parasite of the scale is present in considerable numbers, and may be the cause of the light infestation of this season.

The fir bark beetle, Scolytus ventralis (subscaber) Lec., appears to be on the increase again. A scattered group of 23 red trees was found in the Happy Isles parking area. Most of the new broods had emerged from these trees on August 21, but broods were found in the bases of part of the trees. Some beetles were attacking and laying eggs. Other mines had small to large larvae under the bark, feeding on the cambium.

The Pacific oak twig girdler, Agrilus angelicus Horn, is much in evidence at present. Many of the black oaks have their foliage thickly spotted with small patches of yellowing or reddening leaves. In practically all cases the small shining black scale-like eggs of the girdler can be found on the bark near the base of the new growth. Under the bark at the end of a spiral mine can be found the small white girdler. Usually the girdler does not cause any serious injury to the black oak, and it is believed that it will not do so in this case.

The blue alder girdler, Agrilus burkei Fisher, has killed the tops of a number of alder in the lower part of the Valley. Last year it caused some concern at the Arch Rock Checking Station. Some infestation was found this season, but not so much as last year. This species attacks the alder along most of the streams on the west side of the Sierras. Some trees are killed but enough usually remain to continue the species.

Rustic insects, flatheaded and roundheaded borers: The pillars on the porch of the Rangers' Clubhouse are nearly gone. Part of the trouble is due to decay and part to the boring of various insect larvae.

Control Work

In order to keep the bark beetle damage on the floor of the Valley down to the minimum, it is recommended that a sum of \$500 be placed at the disposal of Acting Forester Adair, to be expended in cutting and treating all the barkbeetle-infested fir and other trees as soon as they are found to be in the proper condition of infestation.

Valuable pines on areas where new building is taking place should be examined every two weeks during the period from April to November. Attacking turpentine beetles and any developing larvae should be cut out and the wounds shellacked and painted with creosote.

Because of the decrease in the number of young oyster shell scale this season and the increase in the number of parasites, it is recommended that spraying be postponed until conditions indicate that it is necessary.

It is not believed that the injury caused to the black oak by the twig girdler is serious enough to call for any control.

Senior Entomologist

Stanford University, Calif.,
August 30, 1929.